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THE BIOLOGICAL STATION AT FAIRPORT, IOWA, AS AN AGENCY FOR PUBLIC SERVICE ¹

THE U. S. Fisheries Biological Station at Fairport, Iowa, combines in a somewhat unique way the functions of a fisheries biological station and a fish-cultural experiment station. Its functions include the propagation and investigation of fresh-water mussels, the conduct of fish-cultural experiment work, investigation of various fresh-water fishery problems, and the promotion both of a fuller utilization of aquatic products and of a broader and more efficient interest in the protection of aquatic resources. With its admirable building, its extensive equipment of ponds and its general environment, it offers unusually favorable conditions for all manner of biological investigations, and the Bureau of Fisheries invites university biologists to avail themselves of the opportunities there afforded for independent research work.

The primary functions of the station are characteristically ecological. In mussel propagation it deals directly with that striking symbiotic relation existing between fish and mussels, the fish being essential to the development of mussels and the mussels promoting, in part directly, and perhaps in greater part indirectly, the food supply of fishes. As a fish-cultural experiment station, it is concerned not so much with fish as with that complex association of fish, insects, molluscs, crustacea, algæ, and other animals and plants, all of which are intimately interrelated and in turn dependent upon physical and chemical conditions of water, bottom soil and land environment—an association which we call in

¹ The functions and opportunities of the Station as expressed by leaders in the dedicatory exercises and conference held at Fairport, Iowa, in October, 1920, are given in this paper, in connection with an account of the exercises and the conference.

more concise and familiar language, a "fish pond."

Nothing so attests public faith in the possibilities of service by a fisheries biological station as the dedicatory exercises and conference held at Fairport on October 7 and 8, 1920. The occasion was marked as one of unusual significance by the attendance of prominent scientists, the representation of leading universities, the collaboration of men prominent in public life, and the hearty co-operation of business men, some of whom came from cities remote from Fairport.

The universities, colleges and scientific institutions represented were the following, in alphabetical order: Cornell College (Iowa), Cornell University (New York), Davenport Academy of Sciences, Doane College (Nebraska), Harvard University, Iowa State College of Agriculture and Mechanical Arts, Iowa State Teachers College, Johns Hopkins University, Leland Stanford Jr. University, Marine Biological Laboratory (Woods Hole, Mass.), Massachusetts Institute of Technology, Massachusetts State Normal School (Westfield), Northwestern University, Purdue University, University of Chicago, University of Florida, University of Illinois, University of Indiana, University of Iowa, University of Michigan, University of Missouri, University of Oklahoma, University of Wisconsin and Yale University.

The morning and afternoon sessions on October 7, were devoted primarily to the industrial and scientific phases, respectively, of the station's functions. All of the addresses were of sufficient general interest to merit printing in full but this unfortunately has proved impracticable. In the following paragraphs each address is represented by abstracts or extracts of such passages as bear most directly upon the significance and functions of a fisheries biological station.

The ceremonies of dedication were presided over by the Hon. Albert F. Dawson, President of the First National Bank of Muscatine, Iowa, formerly member of Congress, who spoke briefly and instructively of the origin of the station.

In presentation of the building to the Department of Commerce on behalf of the public, Professor James M. White, architect of the building, spoke of the value of a pleasing environment to the prosecution of scientific studies, of the contribution of science to the development of architectural forms, and of the possible value of a new sympathy between the architect and the scientist.

The building was received on behalf of the Department of Commerce by the Hon. Edwin F. Sweet, Assistant Secretary of Commerce, who presented a brief address under the title of "Federal and State Responsibilities for Maintaining the Resources of Interstate Waters." Mr. Sweet strongly expressed as a personal view, not that of the Bureau of Fisheries, his belief that the states might advantageously transfer to the federal government the control of fisheries, not only because of the difficulties attending state control in boundary waters, but also because of the lesser influence of local politics in affairs of national administration. He concluded by formally delivering the building to the Bureau of Fisheries.

In a short speech of acceptance Dr. Hugh M. Smith, Commissioner of Fisheries, spoke of the building as an outward sign of a need, an opportunity and an obligation to strive for the accomplishment of great good in behalf of industry. He emphasized the functions of the station in experimental work for the advancement of fish culture, in investigation of fresh-water biological and fishery problems, in promotion of a fuller utilization of the resources of interior waters and in efforts to awaken broader interest in the preservation of useful aquatic animals so that many future generations may partake of nature's bounties as we are privileged to do.

The program of the morning session included an address by Hon. Charles Nagel, Vice-president of the United States Chamber of Commerce and formerly Secretary of Commerce, who had accepted the invitation in terms of unusual cordiality. Mr. Nagel was prevented from attending only by unexpected

engagements arising at the last moment. A congratulatory letter from Hon. William C. Redfield, formerly Secretary of Commerce, was read by Mr. R. L. Barney, director of the station.

This session concluded with an address by Hon. Harry E. Hull, M.C., under the title of "The Significance of the Station to Industries." He discussed the history of the pearl mussel industry, pointed to the service of science in directing measures of conservation and emphasized the national significance of the work of the station.

As the exercises of the morning stressed the industrial relations of the station, so those of the afternoon gave special emphasis to the scientific phases of its activities. The primary address of the afternoon session was by President Edward A. Birge, of the University of Wisconsin, and was entitled "Aquiculture and Science." President Birge congratulated the bureau on the completion of so admirable a building, which he welcomed "not merely for what it is, but even more on account of the promise for the future which is made by its establishment." He had found, he said, that the term "aquiculture" was regarded by some as a peculiarly technical or "high-brow" word though its twin word "agriculture" was looked upon by no one as in any way extraordinary. He compared and contrasted the well-developed science of agriculture (cultivation of plants and animals upon land) with the unfamiliar and largely undeveloped science of aquiculture (cultivation of plants and animals in water). The following quotations from his address are significant.¹

Now the lake is an organism in the same sense that the soil is one. The fish or the clam is not a thing which grows for itself—and for us—alone in a certain environment. It is an integral part of a complex life, a life regulated by chemical substances set free by its manifold operations. These substances stimulate one kind of growth or activity and check another one; and the utilizable crop of fish or of clam shells comes as only one expres-

sion of this complex life, as a sort of by-product of all this intricate activity.

So much as this we know, and we know also that all assured progress in aquiculture depends on our knowledge of this complex life. We must see the problems of fisheries in terms of this life of the waters, just as we see the problem of any specific activity or product of the body in terms of the whole life of which it is an integral part. But we know next to nothing about this life of the waters. We have countless papers on isolated aspects or bits of aquatic life. But there is no knowledge and hardly an attempt to secure the knowledge of the life as a whole—as a "going concern," if I may change my figure. Still less is there any body of knowledge which enables us to place the production of fish—that essential source of food for us—in its proper place in the operation of that "going concern."

... We must not be content with "conserving" our fisheries, though we admit with shame that we are not effecting even this beginning of our task. We too must aim to increase the product of the waters and we can do this only as aquiculture rests on a broad and firm foundation of organized knowledge—of science.

We welcome, therefore, the Fairport Biological Laboratory not merely as a notable addition to the scientific resources of the country, but even more as embodying the promise of a new and advanced policy in dealing with the problems of aquiculture. I can express no higher wish for the laboratory and for the great interests served by it than that it may not only embody the promise but express the potency of that policy.

Professor Frank R. Lillie, representing the University of Chicago and the Marine Biological Laboratory of Woods Hole, Mass., having chosen for his theme "The Spirit of Cooperation in the Bureau of Fisheries" said in part:

The cooperation that you here propose with the industries on the one hand and with the universities through their biologists on the other is a fine program which should be to the advantage of both parties. The relations which both will enter into with the government through this Bureau are among those close personal relations with our too impersonal government which contribute to the feeling that we are one people with one set of interests and a mutual loyalty.

After recalling the spirit of the founder of

¹ The quotations in this paper are by permission of the several speakers.

the Bureau of Fisheries, Professor Spencer Fullerton Baird, and the traditions that he established, he continued:

The universities are dedicated to the advancement of learning; the government naturally devotes itself to the promotion of the welfare of its citizens, but looks far ahead with the aid of science to avoid dangers and to create advantages for them. The disinterested pursuit of learning has so often led to great material gains that we have come to feel that all learning is worth while even from a material point of view. Pure and applied science, when compared, must exhibit angles of divergence, but these are not so broad as formerly, and the workers are cooperating more advantageously than ever before. There is an appreciation of the fact that the great material interests of mankind, the increase of health and the increase of wealth, depend to an increasing extent upon effective cooperation of pure and applied science. Neither can advance rapidly without the other. Together they will hasten the day of liberation from shackles of poverty and disease.

The Bureau of Fisheries bears the distinction of practising this cardinal principle of scientific progress from the day of its foundation. The dedication of this building is a reaffirmation of the strong belief and consistent practise of its wise founder.

Professor George Lefevre of the University of Missouri speaking on the subject "The Fisheries Biological Station in Relation to Universities," said in part as follows:

The history of the station thus far furnishes, among other things, a remarkable and unusual example of the carrying through to realization of a definite purpose, guided by a definite ideal and controlled by the scientific imagination. There has been no faltering on the way, no compromise of the ideal of service, until to-day we witness this inspiring fruition of a purpose consistently maintained and finally expressed in concrete form.

The aims and aspirations which the Bureau had in mind for the Fairport Station were clearly expressed . . . at the beginning . . . in the following words: "This station is the first permanent fresh-water biological laboratory established by the government, and it is intended to become, not only the leading laboratory in America for the study of fresh-water biology, but one of the most important biological stations in the world."

It was a broad-minded and comprehensive policy of the Bureau for uniting both scientific and economic interests for mutual assistance and inspiration, and one that received the strongest endorsement and encouragement, on the one hand, by the universities, especially those of the middle west, and on the other hand by the pearl button industry.

With singular and striking harmony, essential agreement and understanding, and with unusual clearness of vision into the future, a federal bureau, an important industry, and educational institutions have worked together with a single purpose, for a definite end, and for a common good. Is not such a cooperation a heartening thing, and does not the existence of this station here to-day refute the contention of those apostles of individualism who belittle cooperative effort and maintain that all real progress in science springs from the researches of the isolated, independent laboratory worker?

The station is, as has been pointed out by the bureau, quite analogous to the agricultural experiment station, and the service it can render to the development of the aquatic resources of the country is as important and fundamental as is that of the latter to the development of agricultural resources.

Professor C. C. Nutting brought greetings of the State University of Iowa and those of Leland Stanford Jr. University and its president emeritus, Dr. David Starr Jordan. Taking as his theme "The Biological Laboratory as an Aid to Pure Science," Professor Nutting discussed briefly the history of the Bureau of Fisheries, the ideals of Professor Baird and the relations existing in the past between the Bureau of Fisheries and the workers in the field of pure science. He concluded his address with the following question and its answers:

In answer to the question "How can the laboratory best serve as an aid to pure science?" I would say:

First. By proceeding in the future just as it has in the past; by laying a foundation of pure science by the work of the systematist and morphologist and then erecting a superstructure of applied science on this solid basis.

To illustrate just what I mean we have but to refer to the work on the fresh-water mussel. The

exploration of the more important mussel-bearing streams with a view to ascertaining the extent and number of the mussel beds—the source of supply—was done by men trained in the work of pure science. The material thus secured was carefully worked over, classified and described—the work of the systematist—which was embodied in an admirable report. Then Lefevre and Curtis undertook to work out the anatomy and embryology of the mussels of economic importance and to ascertain the species of fish best fitted to act as carriers of the mussel larvæ or glochidia. All of this was purely scientific work, and the results were embodied in a paper entitled “Reproduction and Artificial Propagation of the Fresh-water Mussels,” to my mind an excellent piece of work from a purely scientific standpoint.

With this as a basis, the work of propagation of mussels, the infection of fish best suited to act as hosts to the glochidia and the proposing of laws regarding the mussel industry as a whole could be followed intelligently and effectively. And this, of course, is practical or “applied” zoology.

Second. This laboratory, being in operation through the year, in which it differs from most others in this country, studies of the life histories and ecology of fluviatile species can best be pursued here, and should, in my opinion, be distinctly encouraged. Graduate students from our colleges and universities could be detailed to do this work and thus contribute to pure science and at the same time lay the foundations for work of a distinctly economic bearing.

Third. Material secured here, such as protozoans, mussels, annelids and small crustaceans, could be sent to the biological laboratories of neighboring states and serve a valuable end in supplying such laboratories with many forms desired for class work in botany and zoology.

The raw material from which the scientists of the future must, in the main, be secured is found in the college students now in classes; and anything that aids in the preparation of these students for their future life work will ultimately be of prime importance not only to pure science but also to applied science and the welfare of mankind.

The conference on the morning of the 8th was presided over by Professor Stephen A. Forbes, professor of entomology, University of Illinois, and chief of the Natural History Survey of Illinois. The leading address, entitled “The Biological Resources of our In-

land Waters” was presented by Professor James G. Needham, of Cornell University, who has epitomized his remarks in the following terms:

Fish culture is a branch of animal husbandry. Animal husbandry makes progress about in proportion as it gives attention to the fundamental needs of animals, which are three: (1) Food, (2) Protection, and (3) Fit conditions for reproduction. Fish culture (as now practised) is not like other lines of animal husbandry because it gives adequate attention to only the last of these three. Further progress will lie in studying: (1) One species at a time, (2) One problem at a time, and (3) in one environment at a time. That is my creed for fish culture and for fish management and it applies to fish forage organisms and to fish enemies as well.

Several zoologists and business men participated in the general discussion relating to the subject of the conference.

The entire occasion was made agreeable and memorable through the generous cooperation of the National Association of Button Manufacturers, who gave luncheons at Fairport on the 7th and 8th and a banquet in Muscatine on the night of the 7th. The banquet in Muscatine was the occasion for a considerable number of extemporaneous talks by the various delegates present, and by persons representing the Station, the Bureau and the Department.

R. E. COKER

BRYOZOA AS FOOD FOR OTHER ANIMALS

BRYOZOA are common animals of the coastwise waters everywhere, but they have not been listed with any frequency in the food of other animals—in fact such references are exceedingly rare. It is of some interest, therefore, that I am able to record the fact that certain aquatic birds, at least occasionally, include them in their bill of fare.

Dr. E. W. Nelson, chief of the Bureau of Biological Survey, has recently sent me for determination a small collection of bryozoa taken from the stomachs of the king eider (*Somateria spectabilis*) and the Pacific eider (*Somateria v-nigra*). These ducks were taken